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ABSTRACT

It is hypothesized that the drug, epinephrine, used in conjunction with a fear arousing film on the consquences of smoking would be more effective than either alone in increasing fear and negative attitudes toward smoking and, resultantly, in reducing cigarette consumption. The experimenters assigned 119 subjects to the four cells of a 2x2 factorial design: film vs. no film by epinephrine vs. placebo. A significant film x drug interaction was found with the dependent measure of degree of fear produced. However, contrary to prediction, the difference between the epinephrine and placebo groups was greater in the no film condition than in the film condition. Only main effects for the film variable were found with regard to attitudes toward smoking. All groups reported signficantly reduced smoking from pretest through three followup assessments, but the treatments were not differentially effective. (Author/TL)

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ABSTRACT

It was hypothesized that epinephrine used in conjunction with a fear-arousing film on the consequences of smoking would be more effective than either alone in increasing fear and negative attitudes toward smoking, and in reducing cigarette consumption. 119 smokers were randomly assigned to the four cells of a 2 x 2 factorial design: film vs. no film by epinephrine vs. placebo. While a significant Film x Drug interaction was found with the dependent measure of fear, contrary to prediction, the difference between the epinephrine and placebo groups was greater in the no-film condition than in the film condition. Only main effects for the film variable were found with regard to attitudes toward smoking. All groups reported significantly reduced smoking from pretest through three follow-up assessments, but the treatments were not differentially effective.

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DRUG INDUCED AROUSAL AND FEAR APPEALS[1]

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There is evidence that fear-arousing films which portray the harmful consequences of smoking increase negative attitudes toward smoking (Leventhal and Niles, 1964) and have a suppressive effect upon cigarette consumption (Leventhal and Watts, 1966). The present study was designed to relate these findings to Schachter's (1964) work on the determinants of emotional state. Schachter suggested that the specific emotion subjectively experienced is the product of two factors: general physiological arousal, which is emotionally neutral, and the situational cues which indicate the appropriate cognitive label (e.g. "fear," "elation,") to be given to the feelings of arousal. The presence of only one of the determinants is not sufficient for a specific emotion to be experienced; an interaction of the two is necessary.

Schachter and Singer (1962) induced arousal by injecting Ss with the sympathomimetic agent epinephrine, using the deception that they were evaluating the effect of a vitamin on visual acuity. They provided the Ss with situational cues suggestive of either humor or anger by having a confederate act in either a jocular fashion or pretend to be annoyed. In general, Schachter and Singer's results indicated that the groups administered epinephrine interpreted their emotionally neutral arousal according to the situational cues and were more influenced by the cues than control groups administered placebo. Additional control groups given epinephrine but informed beforehand that the drug would cause symptoms of physiological arousal were less influenced than the epinephrine groups not so informed. The results obtained with the latter control groups suggest some form of deception is necessary. If an individual knows his symptoms of physiological arousal are due to a drug, he has little inclination to interpret his symptoms as any genuine emotion.

In the present study, a film on the harmful consequences of smoking was shown to one group of smokers while a humorous record (unrelated to smoking) was played for a second group. Half of

each group was administered epinephrine while the remainder were administered a placebo. Based upon Schachter's theory, an interaction between physiological arousal and situational cues was predicted with respect to measures of fear, negative attitudes toward smoking, and reduction of cigarette consumption. Specifically, it was predicted that the film would have a greater effect upon the epinephrine group than the placebo group, while there would be less difference between the epinephrine and placebo groups in the record condition. Furthermore, the difference between the film and record groups was expected to be greater in the epinephrine condition than in the placebo condition.

While not relevent to the question of smoking and therefore of secondary interest, a similar interaction can be predicted with respect to measures of positive emotion i.e., feelings of being happy and cheerful. That is, Schachter's theory implies that the record should have a greater effect upon the epinephrine group than the placebo group, while the difference between the epinephrine and placebo groups in the film condition should be less. Furthermore, the difference between the record and film groups in positive emotion should be greater in the epinephrine condition than in the placebo condition.

METHOD

Subjects

Subjects were 119 cigarette smokers recruited by advertising for volunteers in university and city newspapers. Approximately half of the Ss in each treatment group were from the university community. The advertisement described an investigation of procedures designed to help persons stop smoking; the procedures were not specified. Eligibility was limited to smokers who averaged at least 10 cigarettes a day and, as a health precaution, to those under 35 years of age. Respondents to the newspaper advertisement called the Es and were read a standard description of the study as one evaluating procedures designed to reduce smoking. Callers were informed of the possibility of being shown a film about smoking, of being administered a drug, and a brief medical history was obtained. Some respondents failed to report for the experiment, possibly because

the statement about the drug and the questions about their medical history implied some risk involved.

Procedure

A 2 x 2 factorial design was used with two between-subjects experimental manipulations: film vs. no film by epinephrine vs. placebo. Subjects who were shown the film on the dangers of smoking were informed that an evaluation was being made of the effect of a drug on smoking and in temporarily increasing one's ability to assimilate information. While no statement was made that Ss would experience fear, the suggestion that they would have increased ability to assimilate information was designed to insure that Ss would not attribute their emotionally neutral arousal to the drug but instead would interpret their arousal as a fear response to the information on the film.

The film sequence was one found to be a fear-arousing in previous experiments (Leventhal and Niles, 1964; Rogers and Thistlethwaite, 1970).[2] The 18 minute portion of the film used portrays a heavy smoker's discovery that he has lung cancer in an interview with his physician, his discussions with a surgeon, the surgical preparations, and a dramatized version of his trip to the operating room. Throughout the film it is emphasized that there is strong evidence of a casual relationship between smoking and lung cancer.

The record group provided a control for motivating situational cues. The same explanation was given that an evaluation was being made of the effect of a drug on smoking and in temporarily increasing one's ability to assimilate information. For the investigation of the latter effect, these Ss were then instructed to read material (unrelated to smoking or cancer and selected as emotionally neutral) under "conditions of distraction." While no statement was made that Ss would experience positive emotion, to provide further situational cues suggestive of an emotional state quite difference from that suggested by the film, a humorous record was played as the so-called distraction while the Ss read.[3]

Thus, the film groups were provided with situational cues relevant to motivation to stop smoking while the record groups were not; the epinephrine groups were placed in a state of drug-induced arousal

while the placebo groups were not. It was not suggested to any of the groups that the drug would cause symptoms of physiological arousal.

All experimental sessions lasted approximately one hour. Subjects were first given another description of the purpose of the study. They then signed a consent form which stated that they were aware of the possible risks, inconveniences, and benefits to be expected, and that they were participating voluntarily. They next completed a pretest questionnaire which will be described below. All Ss then received a subcutaneous injection of either 0.5 ml of epinephrine, the dosage used in Schachter's research, or a saline placebo from a physician in an adjoining room.[4] Immediately thereafter they either viewed the film or read the material while the record was played. Assignment to the four treatment conditions was random, except in four cases where it was found, despite the previous screening, that epinephrine was medically contraindicated; these Ss were assigned to a placebo group. Immediately after treatment, a second questionnaire was administered which contained each of the dependent measures to be described.

Since Leventhal et al. (1967) found that simply increasing motivation may not be sufficient to change smoking behavior, but that providing instructions is also necessary, all Ss were provided with a list of specific suggestions on how to stop smoking. Subjects were informed they could indicate their wish for a description of the experiment on their final follow-up form and receive a complete explanation of the study including the particular role they played. Follow-up questionnaires designed to assess changes in rate of smoking were mailed one week, one month, and three months after treatment.

Questionnaires

The pretest, posttest, and follow-up were based on the questionnaires of Leventhal et al. (1967).[5] The pretest contained items on smoking history (average daily consumption, how long this average had been smoked, chronicity of habit), and a set of items which assessed attitudes toward smoking (feelings of vulnerability to the diseases associated with smoking, feelings of anxiety about

the effects of smoking on one's health, motivation to stop smoking). The posttest contained mood adjectives which assessed positive and negative emotion (e.g.,happy, fright), and a second set of attitude items. The latter assessed the belief that smoking causes serious illness, the perceived efficacy of stopping smoking as a means of avoiding serious illness, and intentions to stop smoking. Also included on the posttest were one of the pretest items which assessed anxiety and one which assessed vulnerability. All emotion and attitude items were followed up by 9-point graphic rating scales anchored with statements such as Definitely False, Not at All, and Completely Disagree at one end and Definitely True, Very Much, and Completely Agree at the other. An addition to the posttest of Leventhal et al. was items which assessed negative expectancy or judgment about the prognosis for lung cancer patients. The stem, "Realistically, the most likely conclusion of case studies of lung cancer patients is": was followed by different outcome statements, e.g., "Such radical surgery is usually necessary that most die on the operating table." The anchor points for the rating scales of these items were: 1=This happens about 0% of the time, 5=This happens about 50% of the time, 9=This happens about 100% of the time. For all attitude and emotion items, statements were varied so that on some a rating of 9 represented high endorsement and on others low endorsement. Prior to the analysis of results, the ratings were converte so that a high score always indicated high endorsement. Finally, there were questions on the posttest which assessed learning of the content of the film and of the material read in the record condition.

RESULTS

Pretest Measures

There were no differences among the experimental groups on the pretest measures of vulnerability, motivation to stop smoking, chronicity, and rate of cigarette consumption. Despite the random assignment, the group administered a placebo was found to be slightly more anxious about the effects of smoking upon their health than the group administered epinephrine (mean scores = 6.81 and 6.11, $F = 5.09$, $df = 1/115$, $p < .05$). Higbee (1969), however, has reviewed the literature on fear appeals and concluded that initial anxiety level is probably not an important variable.

Emotional Arousal

The mood adjectives measuring negative emotion or fear were summed to provide an overall index, and an analysis of variance for unequal n, using the unweighted means solution, was performed. It was found that there were significant main effects for both the film variable and the drug variable. The film group experienced more fear than the record group, and the epinephrine group experienced more fear than the placebo group. More importantly, there was a significant Drug x Film interaction. Figure 1 shows, however, that the interaction did not conform to the previously described expectation. Orthogonal comparisons revealed the following: within the record condition, the mean fear score of the epinephrine group was higher than that of the placebo group (mean scores = 5.33 and 2.81, $F = 21.74$, $df = 1/115$, $p < .001$); within the film condition, the difference between the epinephrine and placebo groups approached, but did not reach statistical significance (mean scores = 6.01 and 5.07, $F = 3.64$, $df = 1/115$, $p = .07$). Furthermore, the difference between the record plus epinephrine group and the film plus epinephrine group was not significant. In general, instead of the predicted divergence of curves, there was a convergence, as is shown in Figure 1.

Insert Figure 1 about here

A similar analysis of the mood adjectives measuring positive emotion revealed only a main effect for the film variable: the record group had higher positive emotion scores than the film group (mean scores = 8.26 and 4.80, $F = 32.40$, $df = 1/115$, $p < .001$). The main effect for the drug variable approached significance ($p = .08$) with the placebo group exceeding the epinephrine group. It was previously noted with respect to fear scores that within the record condition the epinephrine group exceeded the placebo group (see Figure 1). Thus, there appears to be some tendency, regardless of the situational cues, to interpret the arousal induced by epinephrine as negative emotion; the arousal apparently is not emotionally neutral. There was no Drug x Film interaction.

Attitudes Toward Smoking

Contrary to prediction, there was no significant Film x Drug

interaction with any of the attitude measures. The film condition was superior to the record condition in strenghtening the belief that smoking causes lung cancer (mean scores = 7.96 and 7.30, $F = 6.45$, $df = 1/115$, $p < .02$), and in increasing the perceived efficacy of stopping smoking as a means of avoiding lung cancer (mean scores = 8.17 and 7.61, $F = 6.59$, $df = 1/115$, $p < .02$). The effect of the film in strenghtening intentions to stop smoking approached, but did not reach, statistical significance ($p = .11$). An analysis of covariance of the posttest vulnerability scores (with the pretest score the covariate) revealed that Ss in the film group felt more vulnerable to lung cancer than those in the record group (mean scores =7.97 and 6.49, $F = 7.44$, $df = 1/111$, $p < .01$). A similar analysis of anxiety scores revealed no significant differences. The scores of the record group on the negative expectancy measure were higher than those of the film group (mean scores = 7.50 and 6.83, $F = 5.26$, $df = 1/115$, $p < .05$). Within both the film and the record conditions, there were no differences between the epinephrine and placebo groups in answering content questions, which indicates the epinephrine groups were not more distracted.

Reported Smoking Behavior

Although the failure to respond to the follow-up questionnaire increased with each of the three follow-ups ($\chi^2 = 8.35$, $df = 2$, $p < .05$), there was no differential dropout rate among the four experimental groups at any of the three assessment periods. An equal n (15 in each cell) analysis of the number of cigarettes smoked indicated only that there were significant reductions from pretest through the three follow-ups ($F = 19.55$, $df = 3/168$, $p < .001$); the absence of interactions indicates the treatments were not differentially effective. The grand mean of the four groups dropped from an initial level of 26.3 cigarettes per day to 17.5 per day one week later. One month and three months after treatment, the groups were smoking a mean of 17.2 and 19.2 cigarettes per day, respectively. Thus, three months after treatment, cigarette consumption for all smokers was reduced by a mean of 7.1 cigarettes per day. Orthogonal comparisons indicated that the reductions reported for the first two follow-ups were significant at the .01 level and for the third

follow-up at the .05 level.

The foregoing analyses necessitated dropping some data from the first and second follow-ups to obtain an equal number of Ss at each follow-up stage. In order to include more of the data, analyses of covariance were performed on the data available at each of three stages (N = 100, 68, and 60 in stages one through three). Scores were adjusted for pretest level of cigarette consumption. These analyses also indicated the treatment conditions were not differentially effective. An analysis of the proportion of smokers who reduced smoking more than the mean reduction at each follow-up stage was undertaken, since this analysis is relatively unaffected by changes in within groups variances over time (Edwards, 1960 pp. 51-57). The proportion who reduced consumption was actually slightly higher for the record group than the film group at all stages, but the differences were not significant at any stage.

DISCUSSION

Although a Film x Drug interaction was found with the dependent measure of fear, there was no interaction with either attitudes or reported smoking behavior. Even with regard to emotional state the results were not consistent with the predictions based upon Schachter's position. The difference in mean fear scores between the epinephrine and placebo groups was greater in the record condition than in the film condition. Furthermore, there was no evidence that the interaction of fear-arousing cues and physiological arousal increased fear over either factor operating alone. The mean fear score of the film plus epinephrine group did not exceed that of either the film plus placebo group or the record plus epinephrine group. Finally, with respect to positive emotion, there was no Film x Drug interaction; and, within the record condition, instead of the epinephrine group exceeding the placebo group, the obtained nonsignificant difference was in the opposite direction.

A number of possible reasons for the lack of support for Schachter's position should be considered. Since the same dosage of epinephrine used in Schachter's research was used in the present study, presumably an appropriate level of physiological arousal was induced. It is possible, however, that the situational cues provided were

inappropriate for a test of Schachter's theory. That is, although there is evidence from previous research that the film used is fear-arousing, it is possible the cues provided were not sufficiently strong. With regard to the absence of differential treatment effects upon cigarette consumption, it is also possible,because of the necessary medical screening, that the smokers who participated were sufficiently motivated to stop smoking prior to treatment that the list of instructions and placebo effects alone were sufficient to produce the reported reduction. The overall mean pretest motivation score was 6.12, which approaches "High" (but not "Extremely High") on the 9-point scale. The combination of film and epinephrine may have been more effective than was found with either smokers lower in pretreatment motivation or stronger fear-arousing cues.

Although the drug manipulation had no effect upon attitudes toward smoking, there were changes as a function of the film. Compared to the record, the film strenghtened beliefs that smoking causes lung cancer and increased perceived vulnerability to diseases associated with smoking. This is consistent with the results of Leventhal and Niles (1964) who found that a high fear film was superior to a low fear film in strengthening beliefs, and of Leventhal et al. (1967) who found that a high fear film produced more intense feelings of vulnerability than a moderate fear film. In addition, the present results indicate the film increased the perceived efficacy of stopping smoking as a means of avoiding lung cancer. It is somewhat surprising therefore,that the difference between the film and record groups in intentions to stop smoking did not reach significance. While no entirely satisfactory explanation is available, two factors which may have contributed to the lack of difference in intentions can be noted. As suggested, if Ss were used which exceeded some optimal level of pretreatment motivation, or if the film had insufficient potential to evoke fear, treatment differences may have been reduced. Also, it was found that the film group had lower scores than the record group on items which measure negative expectancy or perceived severity of the outcomes for lung cancer patients. There may therefore have been some tendency to respond to the film by minimizing the consequences of contracting lung cancer rather than by intending to stop smoking.

FOOTNOTES

1. This is an extended version of a paper which was presented at the 1970 American Psychological Association Convention.
2. The film used was "One in 20,000," produced for the American Temperance Society.
3. The record used was "Bill Cosby is a very funny fellow--Right?"
4. Appreciation is expressed to J. Griffith, D. Maxwell, and L. Palmer for their assistance in giving the injections.
5. Appreciation is expressed to H. Leventhal for supplying these questionnaires.

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